CLAIMS

1. An electrically continuous conformal EMI protective shield for coating a region of a printed circuit board comprising:

a low viscosity, high adherence dielectric coating configured to be applied directly to surfaces of one or more regions of the printed circuit board, said dielectric coating configured to provide a layer of insulation that adheringly coats all surfaces of the printed circuit board region; and

a low viscosity conductive coating configured to be applied at least to said dielectric coating to prevent electromagnetic emissions generated by the printed circuit board from emanating beyond the conformal coating,

wherein said EMI shield adheres directly to and conforms with the surface of the printed circuit board region.

2. The conformal EMI shield of claim 1, wherein said dielectric coating is comprised of a dielectric material that is thermally conductive.

3. The conformal EMI shield of claim 1, wherein said dielectric coating has a combination of adhesion and viscosity that enables said dielectric coating to be applied with atomization spay techniques so as to access and adhere to all exposed surfaces of said one or more regions of the printed circuit board.

4. The conformal EMI shield of claim 3, wherein said dielectric coating has a combination of viscosity and adhesion properties sufficient to enable said dielectric coating to be applied via atomization spray techniques to adhere to the surface in the immediate vicinity of where it was applied.

5. The conformal EMI shield of claim 3, wherein said dielectric coating is comprised of a plurality of successively-applied layers of dielectric material.

6. The conformal EMI shield of claim 1, wherein said dielectric coating is thixotropic.

7. The conformal EMI shield of claim 4, wherein said dielectric coating has a viscosity of at least 45" #2 Zahn Cup (full body).

8. The conformal EMI shield of claim 7, wherein said dielectric coating has a viscosity in the range of 50-100" #2 Zahn Cup (full body).

9. The conformal EMI shield of claim 1, wherein said dielectric coating has a viscosity of 70-95" #2 Zahn Cup (full body).

10. The conformal EMI shield of claim 1, wherein said exposed surfaces include cavities and surfaces having tangents that are highly variable.

11. The conformal EMI shield of claim 4, wherein said dielectric coating has an adhesion that enables it to pass the ASTM D-3359-83 Method A Tape Test using a 1" (25 mm wide) semi-transparent pressure-sensitive tape with and adhesion strength of 25-70 ounces per inch when tested in accordance with ASTM Test Method D-3330.

12. The conformal EMI shield of claim 4, wherein said dielectric coating has an adhesion that enables it to pass the ASTM D-3359-83 Method A Tape Test using a 1" (25 mm wide) semi-transparent pressure-sensitive tape with and adhesion strength of 30-50 ounces per inch when tested in accordance with ASTM Test Method D-3330.

13. The conformal EMI shield of claim 4, wherein said dielectric material is comprised of Clear Water Reducible Barrier Coat, Formula Number CQW-L200DF, manufactured by The Egyptian Coating Lacquer Manufacturing Company, Franklin, TN, USA.

14. The conformal EMI shield of claim 1, wherein said dielectric coating is approximately 2 mils thick.

15. The conformal EMI shield of claim 3, wherein said dielectric coating is formed from multiple applications each forming a layer of dielectric coating approximately 1 mil thick.

16. The conformal EMI shield of claim 1, wherein said conductive coating has a viscosity of approximately 10-40" Zahn cup #3.

17. The conformal EMI shield of claim 16, wherein said conductive coating has a viscosity of approximately 15-30" Zahn cup #3.

18. The conformal EMI shield of claim 17, wherein said conductive coating has a viscosity of approximately 15-20" Zahn cup #3.

19. The conformal EMI shield of claim 1, wherein said conductive coating has an adhesion that satisfies ASTM 5B rating.

20. The conformal EMI shield of claim 19, wherein said conductive coating adheres to said dielectric coating, ground pads and other predetermined elements mounted on said printed circuit board.

21. The conformal EMI shield of claim 20, wherein said other predetermined elements of said printed circuit board comprise a metallic cage.

22. The conformal EMI shield of claim 1, wherein said dielectric coating and said conductive coating have a similar composite resin structures.

23. The conformal EMI shield of claim 1, wherein said conductive coating is an aqueous coating composition with particles of conductive metal suspended therein.

24. The conformal EMI shield of claim 1, wherein said conductive coating has an ohmic resistance of between approximately 0.05 and 0.2 ohms per square at a film thickness of approximately 1 mil.

25. The conformal EMI shield of claim 1, wherein said conductive coating has a thickness of approximately 1.1 ± 0.2 mils

26. The conformal EMI shield of claim 1, wherein said conductive coating is TARA EMI-RFI shielding, Formula MQW-L85 manufactured by The Egyptian Lacquer Manufacturing Company, Franklin, TN, USA.

27. An electrically continuous conformal coating for shielding a plurality of regions of a printed circuit board from electromagnetic interference comprising:

a conductive coating having an ohmic resistance sufficient to prevent electromagnetic waves from passing therethrough, wherein said conductive coating adheringly and conformingly coats the surface of each printed circuit board region; and

a dielectric coating interposed between said conductive coating and predetermined portions of each printed circuit board region, wherein said dielectric coating completely insulates said predetermined portions of said printed circuit board,

wherein said conductive coatings of each printed circuit board region are electrically connected to conductive coatings conforming coating and secured to the surfaces of other regions of the printed circuit board.

28. The conformal coating of claim 27, wherein said dielectric coating has a combination of adhesion and viscosity properties that enables said dielectric coating to adhere to all exposed surfaces of a printed circuit board to which it is applied.

29. The conformal coating of claim 28, wherein said dielectric coating has a combination of viscosity and adhesion properties sufficient to enable said dielectric coating to be applied via atomization spray techniques to adhere to the surface in the immediate vicinity of where it was applied.

30. The conformal coating of claim 29, wherein said dielectric coating is comprised of a plurality of successively-applied layers of dielectric material

31. The conformal coating of claim 27, wherein said dielectric coating is thixotropic.

32. The conformal coating of claim 28, wherein said exposed surfaces include cavities and surfaces with a highly variable surface tangent.

33. The conformal coating of claim 27, wherein said dielectric coating has a thickness that is greater than approximately 1.4 mils.

34. The conformal coating of claim 28, wherein said conductive coating adheres to said dielectric coating, ground pads and other predetermined elements mounted on said printed circuit board.

35. The conformal coating of claim 27, wherein said dielectric coating and said conductive coating have similar composite resin structures.

36. A printed circuit board comprising:

a printed wiring board;

a plurality of components mounted on said printed wiring board; and

an electrically continuous conformal coating for providing an EMI-impervious shield conformingly and adheringly on the printed circuit board, including

a conductive coating that prevents the electromagnetic waves from passing therethrough, said conductive coating conformingly and adheringly coating the surface of one or more regions of the printed circuit board, wherein said conductive coating of each said region is electrically connected to each other, and

a dielectric coating interposed between said conductive coating and predetermined portions of each said printed circuit board region, wherein said dielectric coating completely insulates said predetermined portions of said printed circuit board region.

37. The printed circuit board of claim 36, wherein said conformal coating is applied to regions of the printed circuit board defining regions of said conformal coating, wherein said regions of said conformal coating are connected electrically to each other.

38. The printed circuit board of claim 37, wherein said regions of said conformal coating are physically contiguous.

39. The printed circuit board of claim 37, wherein said printed circuit board comprises a plurality of grounding pads mounted in said printed wiring board,

wherein said conductive coating is connected electrically to said grounding pads, wherein aid ground pads are electrically connected to a ground source of the printed wiring board.

40. The printed circuit board of claim 39, wherein said printed wiring board comprises a ground plane and wherein said grounding pads are connected to said ground plane through a ground via.

41. The printed circuit board of claim 40, wherein said printed circuit board further comprises:

a shielded connector mounted on said printed wiring board, said shielded connector connected to a shielded cable through which signals travel;

wherein said ground pads comprise a ground moat mounted on printed wiring board substantially around said shielded connector and connected electrically to a shield of said connector and said ground plane.

42. The printed circuit board of claim 40, wherein said regions of said conformal coating comprise:

a first region coating at least a portion of a top surface of said printed wiring board; and

a second region covering at least a portion of a bottom surface of said printed wiring board.

43. The printed circuit board of claim 40, wherein said ground pads are mounted around a periphery of said printed wiring board, and wherein said first and second regions are connected electrically through said ground plane.

44. The printed circuit board of claim 42, wherein said printed circuit board has edge plating connected electrically to said first and second regions of said conformal coating.

45. The printed circuit board of claim 42, wherein said edge plating is electrically connected to a ground plane of said printed wiring board.

46. The printed circuit board of claim 42, wherein said electrical connection between said first and second regions is provided by a combination of:

a ground land mounted on said top surface and said bottom surface of said printed wiring board proximate to the edge of said printed wiring board; and

a plurality of electrically conductive spring clips spaced around said printed wiring board so as to contact said ground lands on said top and bottom surfaces of said printed wiring board.

47. The printed circuit board of claim 42, wherein said electrical connection between said first and second regions is provided by a plurality of electrically conductive spring clips spaced around said printed wiring board so as to contact said conductive coating of said first region and said conductive coating of said second region.

48. The printed circuit board of claim 42, wherein said printed wiring board comprises signal traces formed on the surface thereof, wherein one or more of the following features are selected alone or in combination such that said surface signal traces have a desired characteristic impedance:

width of said surface signal traces;

thickness of said surface signal traces;

dielectric constant of said dielectric coating; and

thickness of said dielectric coating.

49. The printed circuit board of claim 48, wherein said printed wiring board comprises signal traces formed on surfaces of internal layers only of said printed wiring board.

50. The printed circuit board of claim 40, wherein one or more components are coated individually with a conformal EMI shield, wherein said component shield is electrically connected to said conformal coating on said printed circuit board.

51. The printed circuit board of claim 37, wherein said electrical connection is achieved through vias in the printed wiring board.

52. A method for coating a printed circuit board comprising:

providing a printed circuit board; and

coating said printed circuit board with an electrically continuous conformal coating for providing an EMI-impervious shield conformingly and adheringly on the printed circuit board, including a conductive coating that prevents electromagnetic waves from passing therethrough, said conductive coating conformingly and adheringly coating the surface of one

or more regions of the printed circuit board, wherein said conductive coating of each said region is electrically connected to each other, and a dielectric coating interposed between said conductive coating and predetermined portions of each said printed circuit board region, wherein said dielectric coating completely insulates said predetermined portions of said printed circuit board region.

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